

New patent claims 1 to 10:

- 5 1. A method for regulating an air conditioning unit
for a vehicle with closeable openings in the bodywork,
in particular with a convertible top which can be
opened and closed, wherein a passenger compartment of
the vehicle can be supplied with a controllable
10 temperature by means of an airstream which is fed via
the air conditioning system, and the air conditioning
system controls the temperature of the airstream when
the convertible top is closed in such a way that a
deviation of an actual interior temperature of the
15 passenger compartment determined by means of an
interior temperature sensor from a predefinable
setpoint interior temperature assumes a minimum value,
and a state of an opened opening in the bodywork of the
vehicle is sensed by means of a switching device
20 included in the air conditioning system, characterized
by the following steps,
a state of an opening in the bodywork is sensed (step S0),
if a closed state of the opening in the bodywork has
been sensed in step S0, an air conditioning regulating
25 process is carried out using the parameters of ambient
temperature, setpoint interior temperature, actual
interior temperature and solar radiation and,
if an opened state of the opening in the bodywork has
been sensed in step S0,
30 (step Q1) the solar radiation is sensed and compared
with a previously sensed solar radiation value or the
standard solar radiation value if a solar radiation
value has still not been sensed,
(step Q2) if a rise in the solar radiation value is
35 sensed during the comparison, a blowing out temperature

is reduced by a first value θ_{Aq1} and an air mass flow rate is kept constant or (steps Q3, Q4) the air mass flow rate is additionally increased by a first value M_{q1} if the change in the blowing out temperature alone is not sufficient, wherein the blowing out temperature and the air mass flow rate and, if appropriate, a blowing out direction have previously been determined as a function of the predefinable setpoint interior temperature, the determined actual interior temperature, ambient temperature and solar radiation, or

(step Q5) if a drop in the solar radiation value is sensed during the comparison, the blowing out temperature is increased by a second value θ_{Aq2} and the air mass flow rate is kept constant, or (steps Q6, Q7) the air mass flow rate is additionally increased by a second value M_{q2} if the change in the blowing out temperature alone is not sufficient,

(step T1) the ambient temperature is sensed and compared with a previously sensed ambient temperature or the standard ambient temperature if an ambient temperature has not yet been sensed,

(step T2) if a rise in the ambient temperature is sensed during the comparison, the blowing out temperature is reduced by a first value θ_{A01} and the air mass flow rate is kept constant, or (steps T3, T4) the air mass flow rate is additionally increased by a first value M_{01} if the change in the blowing out temperature alone is not sufficient, or

(step T5) if a drop in the ambient temperature is sensed during the comparison, the blowing out temperature is increased by a second value θ_{A01} and the air mass flow rate is kept constant, or (steps T6, T7) the air mass flow rate is additionally increased by a second value M_{02} if the change in the blowing out temperature alone is not sufficient,

it is determined whether a heating regulating process

or a cooling regulating process is occurring,
in the heating regulating process,
(step V1-H) the speed of the vehicle is sensed and
compared with a previously sensed speed of the vehicle
5 or the standard speed of the vehicle if a speed of the
vehicle has not yet been sensed,
(steps V2-H to V4-H) if a rise in the speed of the
vehicle is sensed during the comparison, the blowing
out temperature is increased by a first value θ_{Av1}
10 and/or the air mass flow rate is increased by a first
value M_{v1} , or
(steps V5-H to V7-H) if a drop in the speed of the
vehicle is sensed during the comparison, the blowing
out temperature is reduced by a second value θ_{Av2} and/or
15 the air mass flow rate is reduced by a second value M_{v2} ,
in the cooling regulating process,
(step V1-H) the speed of the vehicle is sensed and
compared with a previously sensed speed of the vehicle
or the standard speed of the vehicle if a speed of the
20 vehicle has not yet been sensed,
(steps V2-K to V4-K) if a rise in the speed of the
vehicle is sensed during the comparison, the blowing
out temperature is increased by a third value θ_{Av3}
and/or the air mass flow rate is reduced by a third
25 value M_{v3} , or
(steps V5-K to V7-K) if a drop in the speed of the
vehicle is sensed during the comparison, the blowing
out temperature is reduced by a fourth value θ_{Av4} and/or
the air mass flow rate is increased by a fourth value
30 M_{v4} .

2. The method for regulating an air conditioning
system as claimed in claim 1, characterized in that, if
an opened state of the opening in the bodywork has been
35 sensed in step S0 and a blowing out temperature and/or
air mass flow rate has still not been determined by the
method, a constant predefined air mass flow rate M_N and

a blowing out temperature θ_{AN} which is predetermined in accordance with a preselected setpoint temperature are used as first values for each of which a standard solar radiation value, a standard ambient temperature and a standard speed are predefined.

3. The method for regulating an air conditioning system as claimed in claim 1 or 2, characterized in that the step of determining whether a heating regulating process or a cooling process is occurring already takes place at the start of the sequence and if it is determined that a heating regulating process is occurring, in step Q2 the air mass flow rate is reduced by a value M_{q1} , and the blowing out temperature θ_A is kept constant, and/or in step T2 the air mass flow rate is reduced by a value $M_{\theta 1}$ and the blowing out temperature θ_A is kept constant, and if it is determined that a cooling regulating process is occurring, in step Q5 the air mass flow rate is reduced by a value M_{q2} , and the blowing out temperature θ_A is kept constant, and/or in step T5 the air mass flow rate is reduced by a value $M_{\theta 2}$ and the blowing out temperature θ_A is kept constant.

4. The method for regulating an air conditioning system as claimed in one of claims 1 to 3, characterized by the further step (step S8) a change value for the blowing out temperature and a change value for the air mass flow rate are formed from the values θ_{Aq1} , θ_{Aq2} , $\theta_{A\theta 1}$, $\theta_{A\theta 2}$, $\theta_{Av1} - \theta_{Av4}$ and M_{q1} , M_{q2} , $M_{\theta 1}$, $M_{\theta 2}$, $M_{v1} - M_{v4}$, with the values for the increase being added and the values for the reduction being subtracted and the blowing out temperature and the air mass flow rate being regulated in accordance with the change value which is obtained

for the blowing out temperature and the change value which is obtained for the air mass flow rate.

5. The method for regulating an air conditioning system as claimed in claim 4, characterized in that in step 8 a vehicle-occupant-dependent, adjustable correction value is also taken into account in the formation of the change value for the blowing out temperature and the change value for the air mass flow rate, which correction value can contribute to the change values in an additive or subtractive fashion.

6. The method for regulating an air conditioning system as claimed in claim 5, characterized in that the correction value can be adjusted manually or can be defined by adaptive operator control in response to subsequent adjustment by the user.

7. The method for regulating an air conditioning system as claimed in one of claims 1 to 6, characterized in that the values θ_{Aq1} , θ_{Aq2} , θ_{A01} , θ_{A02} , $\theta_{Av1} - \theta_{Av4}$ and M_{q1} , M_{q2} , M_{01} , M_{02} , $M_{v1} - M_{v4}$ are vehicle-dependent and are obtained from profile curves determined by means of measurements on the vehicle.

8. The method for regulating an air conditioning system as claimed in claim 7, characterized in that the profile curves are used only between predefined lower and upper threshold values for the solar radiation, ambient temperature and the speed of the vehicle, and for values below the lower threshold value the change value which is assigned to the lower threshold value is always used, and for values above the upper threshold value the change value which is assigned to the upper threshold value is always used.

9. The method for regulating an air conditioning

system as claimed in claim 8, characterized in that
200 W and 1 000 W are used as threshold values for the
solar radiation, 5°C and 30°C are used as threshold
values for the ambient temperature, and 20 km/h and
5 80 km/h are used as threshold values for the speed of
the vehicle.

10. The method for regulating an air conditioning
system as claimed in one of claims 1 to 9,
10 characterized in that the steps Q1 to Q4 and Q1, Q5 to
Q7, the steps T1 to T4 and T1, T5 to T7 and the steps
V1, V2-H to V4-H and V1, V5-H to V7-H and V1, V2-K to
V4-K and V5-K to V7-K are carried out either in
chronological succession or simultaneously.